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PATENT AND TECHNICAL TRANSLATION

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DECLARATION

The undersigned, Olaf Bexhoeft, hereby states that he is well acquainted with both the English and German languages and that the attached is a true translation to the best of his knowledge and ability of the German text of German Patent Publication DE 197 14 839 C1, published on 04/30/1997 in the name of RITTAL Werk Rudolf Loh GmbH & Co. KG of Herborn, DE.

The undersigned further declares that the above statement is true; and further, that this statement was made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or document or any patent resulting therefrom.

Olaf Bexhoeft

Translation of German Letters Patent DE 197 14 839 C1 in the name of RITTAL WERK RUDOLF LOH GmbH & Co. KG, Herborn, DE - inventor: WAGENER - published 04/30/98

(54) Adapter for a Bus Bar System

(57) The invention relates to an adapter for the mechanical and electrical connection of electrical or electronic units with bus bars of a bus bar system, having a housing in which connecting contacts for the units are provided, wherein connecting lines, which are conducted along one side of the housing, are assigned to the connecting contacts, where they constitute a common connecting level, and wherein the electrical current lines are partially conducted into separate chambers of the housing. A secure and simple placement of the connecting line, along with a simultaneously low structural height of the adapter can be realized if it is provided that the chambers are arranged laterally in the area of the sides of the housing which extend vertically in respect to the connecting level, and if the connecting lines are designed to be flexible.

Specification

The invention relates to an adapter for the mechanical and electrical connection of electrical or electronic units with bus bars of a bus bar system, having a housing in which connecting contacts for the units are provided, wherein connecting lines, which are conducted along one side of the housing, are assigned to the connecting contacts, where they constitute a common connecting level, and wherein the electrical current lines are partially conducted into separate chambers of the housing.

Such an adapter is known from DE 42 44 238 C2. In this case a connecting line, which is embodied as a contact rail, is assigned to each bus bar of the bus bar system. These rigid contact rails are arranged side-by-side in chambers of the housing. Accordingly, the connecting contacts provided on the ends of the contact rail are also arranged side-by-side in the longitudinal direction of the bus bar. Therefore the housing is of a relatively wide construction. Bus bar systems are often employed, whose installation space along the bus bars is limited. Thus, narrow housings for adapters are also advantageous.

DE 38 04 294 C1 describes an adapter, wherein the connecting contacts are arranged lying one behind the other transversely in respect to the longitudinal extension of the bus bars. Insulated cables, which are distributed in the housing, are used as connecting lines. This distribution becomes difficult, because clamping screws for fixing the bus bars in place must remain accessible. It is therefore necessary to bend the loose cables correspondingly in order to keep the clamping screws free. The danger exists that the insulation of the cables is damaged in the course of screwing the clamping screws down, so that short circuits are then created.

It is the object of the invention to create an adapter of

the type mentioned at the outset, which permits a dependable and simple distribution of the connecting lines, along with a low structural height.

This object is attained in that the chambers are arranged laterally in the area of the side of the housing extending vertically in respect to the connecting level, and that the connecting lines are designed to be flexible.

Because the chambers can now extend laterally along the housing, it is possible to arrange the connecting contacts one behind the other. With this a narrow structural width has been achieved. The installation of the connecting lines is possible in a simple manner. They merely need to be placed into the chambers provided for them. The danger of damage and short circuits is dependably removed by this orderly disposition. Introduction of the flexible connecting lines is made possible even with complex courses of the chambers.

It is provided in accordance with an embodiment variation of the invention that the chambers are arranged side-by-side and are sealed from each other by means of separating walls, and that the chambers have been extended as far as the connecting level. The chambers, which are only delimited in respect to each other by the separating walls, can be arranged closely next to each other.

A preferred variation of the invention is characterized in that the connecting lines are designed as non-insulated textile tapes of rectangular cross section, whose wide side extends parallel in respect to the associated side of the housing. Because the connecting lines have been placed on edge, they have little extension in the longitudinal direction of the bus bars, so that the width of the housing is only little affected by the thickness of the connecting line. However, it is possible to convey currents of sufficient strength because of the rectangular cross section. The textile tapes need not be insulated because the chambers already have assumed insulating functions.

A reduction in assembly outlay is possible if it is provided that the connecting line is connected at its one end with a contact element constituting the connecting contact, and on its other end with a binder. A pre-assembled unit has been created by means of this, which can be integrated into the housing.

For example, the binder can have a binder bridge, which can be clamped together with the binder for connecting an outgoing line to the connecting line. The binder bridge has a horizontal leg which can be fixed in place on the housing. The leg makes a transition into an angled-off strip, to which the connecting line is connected, for example welded. Following the strip, the binder bridge has a pressure plate, to which the outgoing line can be clamped by means of a binder screw. Fastening of the binder is made easy if it is provided that the housing has binder holders, which are placed side-by-side and spaced apart and are provided with guide grooves facing each other, whose longitudinal extension is oriented transversely to the connecting lines, and that the binders are pushed into the guide grooves by means of lateral guide faces. Thus the mounting of the binders can take place in a predetermined position. Therefore the connecting line can also always have a predetermined length. Fastening of the binder can take place merely through the guide grooves. In that way can no separate fastening element is required.

It is possible to provide a cover for maintaining the binder in the guide grooves, so that it cannot be displaced, and which can be placed on the housing. This cover then has protrusions, which fix the binder in place.

The invention will be explained in greater detail in what follows by means of an exemplary embodiment represented in the drawings. Shown are in:

Fig. 1, a portion of a bus bar system and an adapter in a perspective exploded view,

Fig. 2, the adapter in accordance with Fig. 2 in an

enlarged partial representation,

Fig. 3, the adapter in the installed state in a partial perspective view.

A bus bar system with three bus bars 40, which are arranged parallel side-by-side, is represented in Fig. 1. On their back, the bus bars 40 are covered by means of a cover 41. To this end, the cover 41 has a bottom 42, on whose front and rear ends respectively two locking legs 43, 45 [are located]. The two snap-in legs of one side are respectively spaced apart parallel from each other. The outer locking leg 43 has an outwardly oriented locking protrusion 44, and the inner locking leg 45 an inwardly oriented locking protrusion 46. A reception chamber for locking feet 10.4, or locking legs 10.6 of the adapter is provided between the two locking legs 43, 45. The insertion movement of the snap-in feet 10.4, or of the locking leg 10.6 into this receptacle is limited by means of a stop 47. A further locking leg 10.5 is arranged on the adapter parallel with the locking leg 10.6 locked in place in the receptacle. The locking leg 10.5 is locked behind the locking protrusion 47 of the outer locking leg 43 of the cover 41. This locking mechanism is represented in detail in Fig. 3. As can be seen from Fig. 3, the two locking legs 10.5 and 10.6 are formed as one piece on the housing 10 made of plastic.

Fig. 1 furthermore shows that the housing 10 of the adapter has two lateral walls 10.1, which rise on both sides from the bottom 10.16. Holders 10.8 for the connecting contacts 20 are attached to the bottom 10.16. In the present example, threaded receptacles for fuses are used as connecting contacts. However, the invention is not limited to this embodiment variation alone. Instead, any arbitrarily designed connecting contacts 20 can be employed. It is the function of the connecting contacts to provide a contact between the associated bus bars 40 and a connecting line 20.2.

In the present case, the connecting line 20.2 is embodied

as a woven copper strip, which can be placed without insulation into chambers 10.11, 10.12 of the housing 10.

The chambers 10.11, 10.12 are separated from each other by means of a dividing wall 10.9. A further dividing wall 10.10 separates the contact element 20 located farthest toward the front from the chamber 10.12. The two chambers 10.11, 10.12 extend laterally of the housing 10 transversely to the longitudinal extension of the bus bars 40. Because of this, the connecting contacts 20 can be arranged in a row one behind the other. In this case the dimensions of the chambers 10.11, 10.12 are such that the connecting line 20.2, which is rectangular in cross section, can be placed standing on edge. Since the connecting line 20.2 is made of a flexible material, it can easily follow the bends in the chamber 10.11, 10.12. A connecting line 20.2 introduced into the chamber 10.12 can be seen in Fig. 2.

A unit consisting of the contact element 20, connecting line 20.2 and binder post 20.9 is furthermore represented in Fig. 1. The connecting contact 20 is fastened by means of a material-to-material connection on one end of the connecting line 20.2, for example welded on it. To this end, the connecting contact has a laterally protruding arm, which makes a transition into an angled-off contact foot. The connecting line 20.1 is fastened on this angled-off contact foot. At its other end, the connecting line 20.1 is fixed in place on a binder bridge 20.3 of the binder post 20.9. The binder bridge 20.3 has a horizontal leg 20.4, which has been placed on the bottom 10.16 of the housing 10. Fixation in place of the leg 20.4 is accomplished by means of a binder screw 20.7, which has been introduced into an opening of the leg 20.4 and screwed into a screw receptacle 10.15 of the bottom 10.16. Following the leg 20.4, the binder bridge 20.3 makes a transition into a vertical strip 20.5. The connecting line 20.2 is connected to the vertical strip 20.5. A horizontal pressure plate 20.6 is bent off the vertical strip 20.5. By means of this the binder

bridge 20.3 is introduced into a binder housing of the binder post 20.9. This introduction movement is shown in dashed lines in Fig. 1. A binder screw 20.8 is used for fixing the binder bridge 20.3 on its pressure plate 20.6.

The component constituted by the finished assembled binder post 20.9, connecting line 20.2 and contact element 20 can be installed as a unit in the housing 10. To this end, the connecting line 20.2 is placed into its associated chamber 10.11, 10.12. The contact element 20 comes to rest on its holder 10.8 For fixing the contact element in place, a fastening screw 20.11 is screwed from the direction of the underside of the housing into an appropriately threaded receiver of the contact element 20.

The binder post 20.3 is inserted into binder post holders 10.13. The binder post holders 10.13 have facing guide grooves 10.14, which in their longitudinal extension are arranged vertically in respect to the bottom 10.16 of the housing 10. The binder post 10.9 can be introduced with lateral guide faces 20.10 into these guide grooves. Thereafter the binder post bridge 20.3 is screwed together by means of the binder screw 20.7 (see Fig. 2).

A cover 30 is used for fixing the binder post 20.9 in place in the vertical direction. The top of the housing 10 can be covered by means of the cover 30. The cover 30 has protrusions, not visible, which keep the binder posts 20.9 in place when the cover 30 has been installed. The cover 30 itself can be locked or screwed together with the housing 10. Openings 33 are located in the upper side of the cover 30, which provide access to the contact element 20. Furthermore, three side-by-side located tool receivers 32 have been used. The binder screws 20.8 of the binder posts 20.9 are accessible through these tool receivers. Outlet lines can be brought through cable ducts 31 to the binder posts 20.9 and fixed in place by means of the binder screws 20.9.

A recessed grip has been cut into the front face 10.2